

A review about Diphotérine® the solution for emergency decontamination of chemical splashes

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Introduction

The diverse range of chemicals currently being used throughout industry present a significant potential hazard to health⁽¹⁾ when personnel become contaminated as a result of accidental splashes⁽²⁾. The need to use a polyvalent and active rinsing solution becomes more and more necessary.

Materials and methods

Diphotérine® is an emergency first aid rinsing solution for eye/skin chemical splashes. Using its hypertonicity⁽³⁾ and its chemical properties⁽⁴⁾, Diphotérine® is able to stop and absorb the aggressiveness of a wide spectrum of chemicals and remove them from the tissues. Diphotérine® is a non toxic⁽⁵⁾ solution (Oral Toxicity LD₅₀>2000 mg/Kg, Test 6564 TAR 1990 CIT, France; Acute Dermal Toxicity LD₅₀>2000 mg/Kg, test 133/9, 1988, Safepharm Laboratories, UK). It is slightly irritant on the skin and non irritant in the eye (test 133/3-133/4, 1987, Safepharm Laboratories, UK). Its residues with acids and bases are non irritant (test 6463TAL/6462TAL, 1990, CIT, France). The environmental effects of Diphotérine® have been studied and it was found non toxic by Microtoxicity (CE₅₀-15 minutes>5000 mg/l, CE₅₀-30 minutes>5000 mg/l) and Aquatic Toxicity (on Daphnia Magna, CE₅₀-24h>5000 mg/l) (tests n°D9811/0611, 1998, SGS Crépin Laboratory, France). Diphotérine® is a medical device CE 0459, first classifying and sterile. Most of the companies mentioned in this report, were previously using water for emergency first aid decontamination of eye/skin chemical splashes without complete success : irremediable sequelae, numerous secondary care and loss of work. Subsequently, the Medical and Health and Safety Services decided to introduce Diphotérine® (or Previn®) for rinsing chemical splashes and to train workers to use it correctly. Previn® is the German version of Diphotérine®. Each ocular or cutaneous chemical splash was rinsed in emergency (some seconds to a few minutes) with Diphotérine®, on location, while undressing if necessary. Then each person went to the medical centre for an examination. In the MANNESMANN company, a secondary rinsing with Diphotérine® was performed in the medical centre. For eye splashes, Sterilized Individual Eye Wash (SIEW) of 50 mL was used within 10 seconds while 500 mL of Diphotérine® was used for a longer time of contact (about a minute). For small skin splashes, such as a hand or a face, a spray of 100 or 200 mL of Diphotérine® was used depending on the time of contact and the area. A big skin splash such as a leg or the chest involved the use of an Autonomous Portable Shower (DAP) with 5L of Diphotérine® in the minute following the accident.

Results

CASE REPORTS

Ocular corrosive splashes rinsed with Diphotérine®

in the FAGERSTA Stainless, factories, in Sweden, 1998-1999

Exposure	Loss of work	Secondary care	Sequelae
Ferropur Na-Hydrid 17.5%	No	No	No
Lye in crystal	No	No	No
basic liquid	No	No	No
Soda*/KMnO ₄ ** pH=14, 80°C	10 days	Yes	No

* : soda=sodium hydroxide; ** : chemical and thermal burn

**Results : no SEQUELAE, no secondary care,
no loss of work excepted one with 10 days****

A SERIE⁽⁷⁾ OF 24 CHEMICAL SPLASHES

rinsed with Diphotérine®
in the MANNESMANN factory, in Germany, 1994-1998

Exposure	Cutaneous splashes	Ocular splashes
Acids*	8	11
Bases**	1	4

*acids : sulfuric acid, nitric acid, phosphoric acid or sulfamic acid, alone or in mixture with the other acids, with a concentration of 5 to 100%
**bases : calcium oxide, 30-45% sodium hydroxide, 30% basic solution

**Results : no DAMAGE, no secondary care, no loss of work
excepted two accidents with one day lost from time**

A STATISTICAL STUDY⁽⁶⁾ ABOUT 42 SODIUM HYDROXIDE (40-600 g/L) SPLASHES rinsed with different rinsing solutions in the MARTINSWERK factory, Germany, 1991-1993

	Diphotérine®	Acetic acid	Water
Loss of work	0,18d ± 0,4	2,91d ± 4,3	8d ± 8,12
No care	100% ± 15%	0 ± 15%	0 ± 15%
Simple care	0 ± 15%	80% ± 15%	25% ± 15%
Medical care	0 ± 15%	20% ± 15%	75% ± 15%

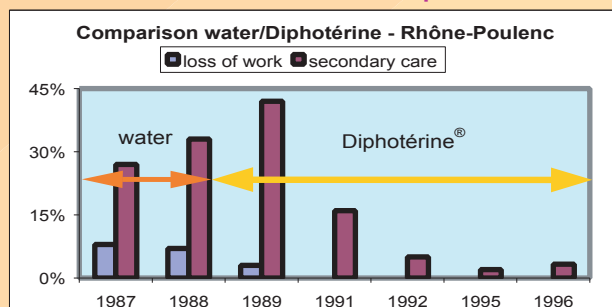
Results : Using Diphotérine® resulted in a noticeable decrease in sick leave average and a standard deviation. No secondary care was necessary. There is a significant difference (p<0.05) between Diphotérine® and water concerning secondary care.

A STATISTICAL STUDY⁽⁶⁾ ABOUT 195 CHEMICAL ACCIDENTS in the RHÔNE-POULENC factory, France, 1987-1996 with two periods

* Until 1989 : immediate rinsing with water during 15 minutes
=> two splashes with big sequelae

- Concentrated, hot nitric acid inducing
 - burns on head, torso, all of the body, eye
 - Hypertension for the right eye
 - reject for the left corneal grafting
 - ocular vision stable at 2/10
- Condensa of soda inducing
 - burns on back and right buttock
 - Important necrosis of the buttock 48 hours after the accident
 - Necessary of a grafting

* from 1989 to 1996 : Immediate rinsing with Diphotérine®
=> No accidents with sequelae



Results : Using Diphotérine® instead of water completely suppressed loss of work and significantly reduced the need for secondary care.

Conclusion

The emergency use of Diphotérine® is a good way for the decontamination of ocular or cutaneous chemical splashes. Its emergent use often gives an immediate pain relief. It achieves a reduction of loss of work and secondary care in all cases and avoids the sequelae for the workers.

References

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